

PhD GRANTS 2024

PhD project title: In-situ studies of the physico-chemistry of ice–volatile organic compounds interactions

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PhD project summary (max. 20 lines):

Ice surfaces are omnipresent on Earth and in the Earth's atmosphere in the form of ice cirrus clouds, glacial clouds, polar stratospheric clouds. It has been shown that ice surfaces can regulate the chemical composition of the atmosphere and strongly influence Earth's biochemical and geochemical cycles. For example, the ice phase is a source of substantial removal of volatile organic compounds (VOCs) through adsorption and absorption. The aim of this thesis project is to carry out experimental studies of ice-volatile organic compound (VOC) interactions using a simulation chamber recently developed at the PhLAM laboratory and coupled with a high-resolution terahertz spectrometer. Gas phase spectroscopy will be complemented by Fourier transform infrared measurements to make the link with the solid phase of ice. Particular emphasis will be made on biogenic VOCs such as monoterpenes and their oxidation products which represent a large structural variety. We will thus benefit from the spectral resolution and sensitivity of terahertz rotational spectroscopy, to be able to independently analyze and characterize the species whether they are tautomers, isomers, conformers or isotopomers, and to identify with absolute specificity the chemical composition and the ratio of reaction products at the air/ice surface interface in the atmosphere.